REMARKS

Claims 1-16 are pending in the above-identified patent application. By this Amendment Applicant has amended claims 1, 3, 6-7, 11-12, and 14 in order to further define the present invention.

In the above Office Action, the Examiner has rejected pending claims 1-16 under 35 U.S.C. §102(e) as being anticipated by Cheung et al (US 5,812,531). A portion of the Examiner's characterization of Cheung made in support of the outstanding rejection of claim 1 is set forth below:

> The claims in their present form use terms like nodes and do not make it clear as to when the applicant is referring to AP and mobiles. Also phrases like "network information" are not very specific.

Applicant appreciates the Examiner's efforts in pointing out that confusion may have been engendered by the recitation in the previously-pending claims of terms such as "network access node" together with "plurality of nodes". The claims have accordingly been amended to recite "network access point", thereby drawing a distinction to the "nodes" which may be in communication with such access points and with other such nodes.

Data Forwarding System of the Present Invention

The present invention relates to a data communication system capable of forwarding IP-addressed data to devices as such devices move among networks having different IP addresses. The present invention includes first and second networks containing first and second pluralities of nodes and first and second network access points, respectively. The first and second network access points are adapted to receive data transmissions from an external network.

In an exemplary embodiment, upon joining the first network a given node is assigned an IP address which remains with it irrespective of whether it moves beyond the range of the first network. When the node roams into the vicinity of the second network, data addressed to the node which is received at the first network is forwarded via an internetwork path to at least one node of the second network to the roaming node. Consistent with the invention, this internetwork path includes one or more wireless connections involving nodes of the first and second networks.

This aspect of the present invention is described in the specification as follows:

> In order to establish a connection between nodes D1 and Al, node L3 establishes a connection to node L2 which in establishes a connection to node Al. Once these connections have been made, node Al will forward any data packets, addressed to D1 that it has received over the hard-wired network 12.
> [6:20-23]

It is noted that although node D1 is a member of wireless network 20 and node L3 is a member of wireless network 22, node D1 nonetheless receives message information addressed to it while within the coverage area of the second wireless network 22 from node L3. Consistent with the invention, this is facilitated by the establishment of an internetwork path which includes wireless connections from node L3 to node L2 and from node L2 to node L1. Accordingly, packets addressed to node D1 and received by access point A1 over the hard-wired network 12 may be forwarded to node D1 via this internetwork path. It is observed that one or more of the wireless connections of the internetwork path (e.g., from node L3 to node L2 and from node L2 to node L1) are to the exclusion of either of the access points A1 or A2. That is, packets addressed to node D1 and received by the access point A1 over the hard-wired network 12 are forwarded to node D1 over a path which includes certain wireless connections not involving either access point A1 or A2.

One motivation for the data forwarding scheme of the present invention relates to the difficulty in continuing IP-based communication even when nodes move between networks having different IP addresses. Conventional systems are generally incapable of overcoming this difficulty, since it is impermissible to simply "register" an IP address for a device associated with a given network in a different IP network (i.e., a network having a different network address). Rather than requiring a device previously registered in a first network to instead become registered in a second network upon roaming to it, the present invention provides a unique wireless internetwork path through which message information addressed to the device can be forwarded to it after the device has roamed to a different network.

The Cheung System

The system described by Cheung provides internetworking services to wireless nodes, which may be part of a wireless LAN:

> The invention provides a method and means for using one or more APs as internetworking devices which interconnect a wired LAN and wireless nodes within range of each AP, and for determining when each AP should act to transmit data between the wired LAN and wireless nodes.
> [3:26-30]

In Cheung's system, wireless nodes communicate with the wired LAN exclusively through the AP with which they are registered:

> The APs use a process of registration (of the wireless nodes) to carry out these functions. Each wireless node within range of at least one AP will be registered to a single AP, even if it is within range of more than one AP. Once an AP registers a wireless node, it will act to forward data to and from the wireless node.
>
> For example, whenever an AP overhears a directed packet on the wired LAN addressed to a wireless node, the AP will check to see if that node is registered with it. If so, the AP will forward the data packet to the node. Otherwise, the AP will ignore the packet. Similarly, whenever an AP overhears a broadcast packet on the wired LAN, it will retransmit the packet to all wireless nodes registered with it.
> [3:53-65]

This "registration" aspect of Cheung's system influences the manner in which communication is facilitated with a wireless node which has roamed from the coverage area of one AP to another AP. In particular, such a wireless node "de-registers" upon losing contact with a particular AP and then "re-registers" upon coming into contact with another AP. Once the wireless node has become registered with the new AP, message information addressed to or origination from the node is communicated via the new AP:

> FIG. 4 illustrates how a roaming wireless node can move in and out of different APs' BSAs. When a wireless node moves between BSAs of APs, it is deregistered with one AP and registered with another. *The data packets sent by the wireless node to the wired LAN are resent by different APs depending on where the wireless node is, and which AP the wireless node is registered with. Likewise, data packets destined for the wireless node are resent by different APs depending on where the wireless node is and which AP the wireless node is registered with.*
>
> When a node roams, it may roam out of range from all APs. The wireless node will then be disconnected from the wired LAN until it again becomes registered with some AP. Of course a roaming node can not become registered with an AP until it becomes aware of the presence of the wireless node (ie, overhears either the wireless node's topology

broadcast or regular transmission). Optionally, to further shorten the time between the wireless node moving into an AP's BSA and the AP detecting its existence, each wireless node could schedule its topology broadcast earlier when it first overhears an AP.

Referring to FIG. 4 by way of an example, wireless node A originally located at position 200, is registered with AP1. It therefore communicates with wired network node X via AP1. As A moves to an area which is not covered by any AP, as is illustrated as position 210, it is disconnected from the network. Its communication with X is severed until it becomes registered by another AP. Thus when as A moves into AP2's BSA, as shown at 220, and AP2 overhears it. At this point, A can again communicate with X, this time via AP2. AP2 will send a registration notice on the wire LAN, informing other APs, in this case AP1, that AP2 has now registered node A, so that AP1 should deregister it. AP1 may have already deregistered A if AP1 had not heard A after a set period of time. Assuming an entire area is sufficiently covered by APs, A can move around the area while remaining connected to the network.
[11:9-45, italics added]

Accordingly, Cheung does not describe an approach in which data is "forwarded" using one or more of the nodes in communication with an access point in which a node was originally registered upon roaming of the node to the vicinity of a different access point; rather, the node de-registers with the original access point and registers with the new access point upon roaming into its coverage area.

Differences Between the Cheung System and the Present Invention

The system of Cheung fundamentally differs from that of the presently claimed invention with respect to the manner in which message information is communicated to a node which has "roamed" into the coverage area of another access point. As was described above, in the Cheung system a mobile node registers with a new access point, de-registers with its original access point, and receives message information from a wired LAN or other external network through the new access point. Similarly, message information transmitted by the roaming node is transmitted through the new access point to the wired LAN or external network once the roaming node has become registered with the new access point. It follows that Cheung need not provide any mechanism for forwarding data addressed to a node associated with an AP upon movement of the node to a different AP, since the node will have de-registered with the original AP (so data for the node is not delivered to the original AP after the node has de-registered from it).

In contrast to the Cheung system, the system of the invention does not rely upon registration/de-registration with different access points when a wireless node roams between the

networks associated with such access points. Instead, the present invention contemplates that a wireless internetwork path be established between the network with which the node is associated and the network to within which the node has roamed. Consistent with the invention as presently claimed, this wireless internetwork path includes one or more wireless connections involving nodes of the first and second wireless networks to the exclusion of the access points associated with such networks. That is, one or more of the wireless connections of the wireless internetwork path do not include an access point of either network (e.g., the connections are established directly between different nodes of the first and second wireless networks or with an internetworking node common to both networks). Cheung not only does not describe the establishment of such wireless connections for the purpose of forwarding data to a moving node, but in fact teaches away from such an approach by utilizing the AP registration/de-registration process discussed above to facilitate communication with such a node.

Applicant observes that the teachings of the presently claimed invention may be used to overcome the difficulty of continuing IP-based communication when moving between networks having different IP addresses. Systems such as that described by Cheung are incapable of overcoming this difficulty, since it is impermissible to simply "register" an IP address for a device associated with a given network in a different IP network (i.e., a network having a different network address). Rather than requiring a device previously registered in a first network to become registered in a second network upon roaming to it, the present invention provides a unique wireless internetwork path through which message information addressed to the device can be forwarded to it after the device has roamed to a different network.

These distinctions between the Cheung system and the present invention are highlighted by the pending claims, which recite that the claimed wireless internetwork path includes one or more wireless connections involving at least one of the first plurality of nodes and at least one of the second plurality of nodes to the exclusion of the first network access point and the second network access point. As was discussed above, Cheung does not describe creation of an analogous internetwork path through which message information may be forwarded, since in the Cheung system information destined for a given node is not received by an AP unless the destination nodes is currently registered with the AP. Moreover, Cheung further does not suggest

that such an internetwork path include or more wireless connections involving nodes within first and second wireless networks, exclusive of the access points of such networks.

Accordingly, in view of Applicant's arguments and amendments set forth herein, it is respectfully requested that the Examiner reconsider the outstanding rejection under the cited prior art. The undersigned would of course be available to discuss the present application with the Examiner if, in the opinion of the Examiner, such a discussion could lead to resolution of any outstanding issues.

The Commissioner is hereby authorized to charge any appropriate fees under 37 C.F.R. §§1.16, 1.17, and 1.21 that may be required by this paper, and to credit any overpayment, to Deposit Account No. 03-3117.

Dated: December 4, 2003

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